WHAT IS CLAIMED IS:

1. A method for producing a magnesium nitride coating on the particles in a loose bed of at least one titanium containing oxide to improve the wetting of the oxide by molten aluminum alloy, the method comprising providing a nitrogen-containing atmosphere to said particles, and contacting a source of magnesium metal in a molten or vapor phase to said loose bed.

2. A method for producing a metal matrix composite body comprising at least one titanium containing oxide reinforcement in an aluminum alloy matrix by means of a pressure casting process, the method comprising:

a. providing a powder bed comprising at least one titanium-containing oxide;

b. providing at least one alloy of aluminum as an infiltrant;

c. pressure infiltrating said infiltrant into said powder bed to form a composite body; and

d. cooling such composite body to form a solid.

3. A method for producing a metal matrix composite comprising at least one titanium containing oxide reinforcement in an aluminum alloy matrix by using a pressure-less infiltration process

a. providing a permeable mass comprising at least one titanium-containing oxide the particles of which have been coated with magnesium nitride;

b. providing at least one aluminum-based metal as an infiltrant;

c. in molten form, at atmospheric pressure infiltrating said infiltrant into said permeable mass to form a composite body; and

d. cooling such composite body to form a solid.

4. A method for producing a metal matrix composite body comprising at least one titanium-containing oxide reinforcement in an aluminum alloy matrix by means of a wetting enhancer and a pressure casting process

a. providing a permeable mass comprising particulate of at least one titanium-containing oxide, the particles of which have been coated with magnesium nitride;

b. providing at least one alloy of aluminum as an infiltrant;

c. pressure infiltrating said infiltrant into said permeable mass to form a composite body; and

d. cooling such composite body to form a solid.

5. A method for reducing titanium metal from its oxides, comprising:

a. providing a composite body by means of any of claims 0 through 3 above; and

b. chemically reacting said reducing aluminum of said matrix and said titanium-containing oxide in said composite body in a redox reaction to form a chemically transformed composite body, and thereby reducing said titanium-containing oxide to a titanium-containing metal.

6. A method for reducing titanium metal from its oxides, comprising:

a. providing a permeable mass comprising at least one titanium-containing oxide;

b. providing at least one alloy of aluminum as an reactive infiltrant; and

c. reactively infiltrating said alloy into said titanium containing oxide to form a composite comprising aluminum oxide, and titanium-containing metal.

7. The method of claim 6, wherein said infiltrating is done in an oxidizing atmosphere to produce a ceramic matrix composite, and further wherein said ceramic matrix composite comprises at least one titanium-containing oxide.

8. A method for reducing titanium metal from its oxides comprising:

a. Forming a ceramic matrix composite pursuant to claim 6; and

b. Further chemically reacting said constituents of said ceramic matrix composite redox reaction to form a chemically transformed composite body and thereby reducing said titanium-containing oxide to a titanium-containing metal.

9. The method of claim 6, wherein said ceramic matrix composite further comprises at least one of elemental titanium and at least one aluminide of titanium.

10. The method of any of claims 5 and 8, further comprising separating said titanium-containing metal from said chemically transformed composite body.

11. The method of any of claims 6 and 7, further comprising separating said titanium-containing metal from said composite body.

12. The method of claim 3, wherein said infiltrating is carried out at a temperature of at least about 700C.

13. The method of claim 6, wherein said reactive infiltration is carried out at a temperature of at least about 1250C.

14. The method of any of claims 5 or 8, wherein said redox reaction is carried out at a temperature of at least about 1250C.

15. The method of any of claims 5 or 8, wherein said redox reaction is carried out at a temperature of at least about 1850C.

16. The method of claim 5, further comprising adding at least one alpha titanium stabilizer to at least one of the reducing metal and the bed (or permeable mass).

17. The method of claim 5, further comprising adding at least one beta titanium stabilizer to at least one of the reducing metal and the bed (or permeable mass).

18. The method of claim 5, further comprising adding vanadium metal to at least one of the reducing metal and the bed (or permeable mass).

19. The method of claim 5, further comprising adding at least one oxide of vanadium to the bed (or permeable mass).

20. The method of any of claims 10 or 11, wherein said titanium-containing metal comprises titanium stabilized in at least one form selected from the group consisting of alpha, beta, and alpha-beta forms.